

BODY COMPOSITION ASSESSMENT (BCA)

1. Background and Rationale

a. In 1985, a panel of experts at the National Institute of Health (NIH) determined the extent to which excess body fat is associated with negative health consequences. Negative health consequences include an increased risk of high blood pressure, diabetes, cancer, and cardiovascular disease. Excess body fat is also associated with the inability to maintain physical performance (especially in hot climates) and may be correlated with a lack of fitness and stamina. Although body fat typically increases with age in Americans, it is not a healthy process, and frequently is simply the result of decreased activity and or dietary indiscretion.

b. Based on scientific research the NIH conference defined obesity as the amount of body fat associated with significant detrimental health effects. This corresponded to a weight-for-height 20 percent above the midpoint weight for a medium-frame individual, based on the 1983 Metropolitan Life Insurance Height-Weight Tables. Naval Health Research Center (NHRC) scientists reviewed this and numerous other scientific studies and recommended the NIH definition of obesity as the upper limits for Navy standards. Since DOD prescribes body fat percentage as the measure of body composition, NHRC determined upper allowable Navy limits to correspond to 22 percent for men and 33 percent for women. Most members should have a significantly lower level of body fat than the upper allowable Navy limits.

2. Purpose

a. Provide members with goals to promote basic physical fitness, health, and readiness.

b. Provide command a means of assessing the general fitness of members of command.

3. Maximum Allowable Body Fat Percentages

a. Age-adjusted maximum allowable Navy body fat percentages are

	Age (years)	
	17-39	40-40+
Male	22%	23%
Female	33%	34%

b. Most personnel should have a significantly lower percentage of body fat.

4. BCA Procedures

a. Maximum weight for height screening

(1) Height measurement

(a) Member removes shoes.

(b) Member stands with feet together, flat on the deck, takes a deep breath, and stretches tall.

(c) Record height. Fractions of an inch in height shall be rounded up to the nearest half-inch.

(2) Weight measurement

(a) Member shall be weighed on a balance beam or digital scale in PT-type clothing (shorts, T-shirt) without shoes.

(b) One pound deduction is made for clothing, regardless of how member is dressed.

(c) Record weight. Fractions of a pound in weight shall be rounded down to nearest whole pound.

(3) Maximum weight determination

(a) In center column of maximum-weight-for-height table (appendix A of this enclosure), find smallest value equal to or exceeding member's height.

(b) If member's weight is less than or equal to the maximum weight listed for their gender, members are within body composition assessment standards and percentage body fat determination is not required.

b. Body fat percentage determination

(1) Non-stretching cloth, metal, or fiberglass tape measure shall be applied to body landmarks with sufficient tension to keep it in place following the contour of the body without indenting skin surface. All measurements will be taken on the right side of the body.

(2) Procedures for Men

(a) Body fat percentage for men is calculated from measurements of standing height, neck circumference, and abdomen circumference.

(b) Members shall be measured in presence of another member (preferably of member's sex), if requested.

(c) Standing height. Use height measurement from maximum weight for height screening.

(d) Neck circumference



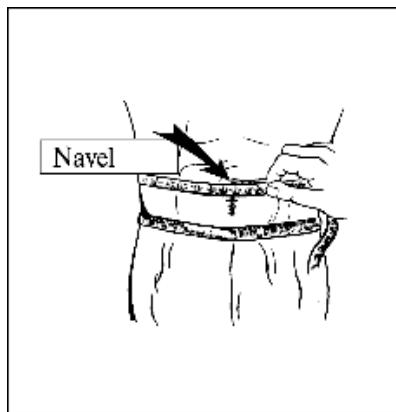
1. Measurement shall be taken on bare skin.

2. Members look straight ahead with shoulders down (not hunched).

3. Measure neck circumference at a point just below larynx (Adam's Apple) perpendicular to long axis of neck.

4. Round neck measurement up to nearest 1/2 inch and record (e.g., round 16 1/4 inches to 16 1/2 inches).

(e) Abdomen circumference



1. Measurement shall be taken on bare skin.

2. Arms are at sides. Take measurement at end of member's normal, relaxed exhalation.

3. Measure abdominal circumference with tape at level of center of navel and parallel to deck.

4. Round abdominal measurement down to nearest 1/2 inch and record (e.g., round 34 3/4 to 34 1/2 inches).

(f) Body fat calculation

1. Subtract neck circumference from abdominal circumference to obtain member's circumference value.

2. On appropriate percent fat estimation table (appendix B of this enclosure) find intersection of column equal to member's height (rounded up to nearest half inch) and row equal to member's circumference value.

3. Member's body fat percentage equals number at intersection of row and column. For circumference value less than value in table, body fat percentage is less than or equal to smallest body fat percentage in column. For circumference value greater than value in table, body fat percentage is greater than or equal to largest body fat percentage in column.

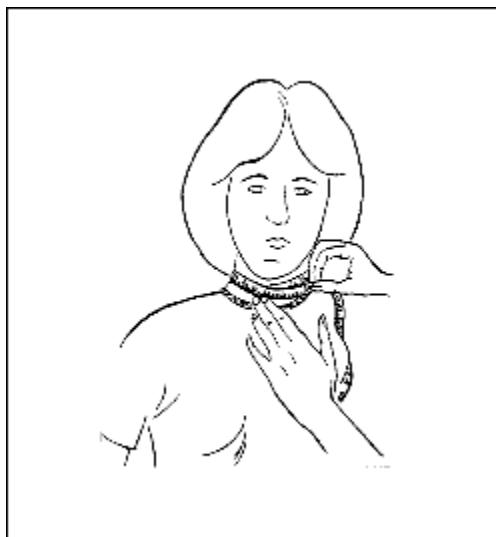
(3) Procedure for Women

(a) Body fat percentage for women is calculated from measurements of standing height, neck circumference, natural waist circumference, and hip circumference.

(b) Members shall be measured in presence of another member (preferably of member's sex), if requested.

(c) Standing height. Use height measurement from maximum weight for height screening.

(d) Neck circumference



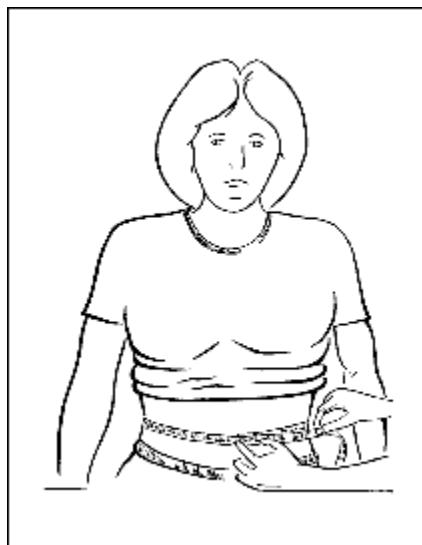
1. Measurement shall be taken on bare skin.

2. Members look straight ahead with shoulders down (not hunched).

3. Measure neck circumference at a point just below larynx (Adam's Apple) perpendicular to long axis of neck.

4. Round neck measurement up to nearest 1/2-inch and record (e.g., round 16 1/4 inches to 16 1/2 inches).

(e) Natural waist circumference



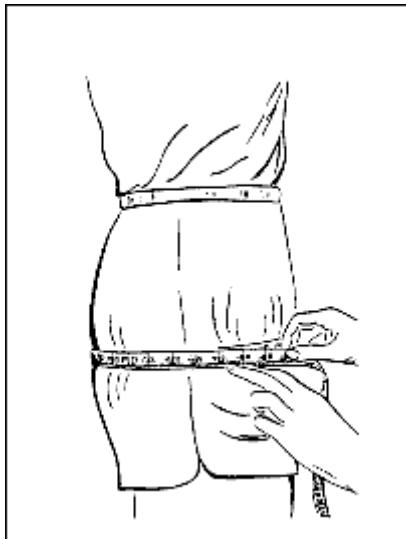
1. Measurement shall be taken on bare skin.

2. Arms are at sides. Take measurement at end of member's normal, relaxed exhalation.

3. Measure natural waist circumference, at point of minimal abdominal circumference with tape level and parallel to deck. (Note: This site is usually located about halfway between navel and lower end of sternum/breastbone. When this site is not easily observed, take several measurements at probable sites and use smallest value).

4. Round natural waist measurement down and record to nearest 1/2 inch (e.g., round 28 5/8 inches to 28 1/2 inches).

(f) Hip circumference



1. Measurement shall be taken over lightweight loose-fitting gym shorts or pants. Tight-fitting rubberized foundation garments or exercise belts shall not be worn at least 30 minutes before measuring. Control-top panty hose, spandex tights, and other "shaping" garments shall not be worn during measuring.

2. While facing member's right side measure hip circumference by placing tape around hips so that it passes over greatest protrusion of gluteal muscles (buttocks) as viewed from side. Ensure tape is level and parallel to deck. Apply sufficient tension on tape to minimize effect of clothing.

3. Round hip measurement down to nearest 1/2-inch and record (e.g., round 44 and 3/8 inches to 44 inches).

(g) Body fat calculation

1. Add waist and hip circumferences, then subtract neck circumference to obtain member's circumference value.

2. On appropriate percent fat estimation table (appendix B of this enclosure), find intersection of

column equal to member's height (rounded up to nearest half inch) and row equal to member's circumference value.

3. Member's body fat percentage equals number at intersection of row and column. For circumference value less than value in table, body fat percentage is less than or equal to smallest body fat percentage in column. For circumference value greater than value in table, body fat percentage is greater than or equal to largest body fat percentage in column.

5. Grading BCA

a. BCA is failed (not within BCA standards) when members exceed both maximum weight for height and body fat percentage allowed for member's age and gender.

b. BCA is passed (within BCA standards) when members

(1) exceed maximum weight for height, but not maximum body fat percentage allowed for member's age and gender.

(2) do not exceed maximum weight for height allowed for member's age and gender.

(3) meet or are less than maximum weight for height and maximum body fat percentage allowed for member's age and gender.

MAXIMUM WEIGHT FOR HEIGHT SCREENING TABLE
Maximum Weight in Pounds

Men Maximum Weight (pounds)	Member's Height (Inches) (fractions rounded up to nearest whole inch)	Women Maximum Weight (pounds)
97	51	102
102	52	106
107	53	110
112	54	114
117	55	118
122	56	123
127	57	127
131	58	131
136	59	136
141	60	141
145	61	145
150	62	149
155	63	152
160	64	156
165	65	160
170	66	163
175	67	167
181	68	170
186	69	174
191	70	177
196	71	181
201	72	185
206	73	189
211	74	194
216	75	200
221	76	205
226	77	211
231	78	216
236	79	222
241	80	227
246	81	233
251	82	239
256	83	245
261	84	251
266	85	257
271	86	263

PERCENT FAT ESTIMATION FOR MEN

Circumference Value*	Height (inches)										
	60.0	60.5	61.0	61.5	62.0	62.5	63.0	63.5	64.0	64.5	
13.0	8	8	8	8	7	7	7	7	6	6	
13.5	10	9	9	9	9	8	8	8	8	8	
14.0	11	11	10	10	10	10	10	9	9	9	
14.5	12	12	12	11	11	11	11	11	10	10	
15.0	13	13	13	13	12	12	12	12	12	11	
15.5	15	14	14	14	14	13	13	13	13	12	
16.0	16	15	15	15	15	15	14	14	14	14	
16.5	17	17	16	16	16	16	15	15	15	15	
17.0	18	18	17	17	17	17	16	16	16	16	
17.5	19	19	19	18	18	18	18	17	17	17	
18.0	20	20	20	19	19	19	19	18	18	18	
18.5	21	21	21	20	20	20	20	19	19	19	
19.0	22	22	22	21	21	21	21	20	20	20	
19.5	23	23	23	22	22	22	22	21	21	21	
20.0	24	24	23	23	23	23	22	22	22	22	
20.5	25	25	24	24	24	24	23	23	23	23	
21.0	26	26	25	25	25	25	24	24	24	24	
21.5	27	26	26	26	26	25	25	25	25	24	
22.0	28	27	27	27	27	26	26	26	26	25	
22.5	28	28	28	28	27	27	27	27	26	26	
23.0	29	29	29	29	28	28	28	28	27	27	
23.5	30	30	30	29	29	29	29	28	28	28	
24.0	31	31	30	30	30	30	29	29	29	29	
24.5	32	31	31	31	31	30	30	30	30	29	
25.0	33	32	32	32	31	31	31	31	30	30	
25.5	33	33	33	33	32	32	32	31	31	31	
26.0	34	34	34	33	33	33	32	32	32	32	
26.5	35	35	34	34	34	33	33	33	33	32	
27.0	36	35	35	35	34	34	34	34	33	33	
27.5	36	36	36	35	35	35	35	34	34	34	
28.0	37	37	36	36	36	36	35	35	35	35	
28.5	38	37	37	37	37	36	36	36	36	35	
29.0	38	38	38	38	37	37	37	37	36	36	
29.5	39	39	39	38	38	38	37	37	37	37	
30.0	40	39	39	39	39	38	38	38	38	37	
30.5	40	40	40	40	39	39	39	39	38	38	
31.0	41	41	40	40	40	40	39	39	39	39	
31.5	42	41	41	41	41	40	40	40	40	39	
32.0	42	42	42	42	41	41	41	40	40	40	

*Circumference value = abdomen circumference - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR MEN

Circumference Value*	Height (inches)										
	65.0	65.5	66.0	66.5	67.0	67.5	68.0	68.5	69.0	69.5	
13.0	6	6	6	5	5	5	5	5	4	4	
13.5	7	7	7	7	6	6	6	6	6	5	
14.0	9	8	8	8	8	8	7	7	7	7	
14.5	10	10	9	9	9	9	9	8	8	8	
15.0	11	11	11	10	10	10	10	10	9	9	
15.5	12	12	12	12	11	11	11	11	11	10	
16.0	13	13	13	13	13	12	12	12	12	11	
16.5	14	14	14	14	14	13	13	13	13	13	
17.0	16	15	15	15	15	14	14	14	14	14	
17.5	17	16	16	16	16	16	15	15	15	15	
18.0	18	17	17	17	17	17	16	16	16	16	
18.5	19	18	18	18	18	18	17	17	17	17	
19.0	20	19	19	19	19	19	18	18	18	18	
19.5	21	20	20	20	20	19	19	19	19	19	
20.0	22	21	21	21	21	20	20	20	20	20	
20.5	22	22	22	22	22	21	21	21	21	20	
21.0	23	23	23	23	22	22	22	22	22	21	
21.5	24	24	24	24	23	23	23	23	22	22	
22.0	25	25	25	24	24	24	24	24	23	23	
22.5	26	26	25	25	25	25	25	24	24	24	
23.0	27	27	26	26	26	26	25	25	25	25	
23.5	28	27	27	27	27	26	26	26	26	26	
24.0	28	28	28	28	27	27	27	27	27	26	
24.5	29	29	29	29	28	28	28	28	27	27	
25.0	30	30	30	29	29	29	29	28	28	28	
25.5	31	31	30	30	30	30	29	29	29	29	
26.0	32	31	31	31	31	30	30	30	30	29	
26.5	32	32	32	32	31	31	31	31	30	30	
27.0	33	33	32	32	32	32	32	31	31	31	
27.5	34	33	33	33	33	33	32	32	32	32	
28.0	34	34	34	34	33	33	33	33	33	32	
28.5	35	35	35	34	34	34	34	33	33	33	
29.0	36	36	35	35	35	35	34	34	34	34	
29.5	36	36	36	36	35	35	35	35	35	34	
30.0	37	37	37	36	36	36	36	35	35	35	
30.5	38	38	37	37	37	37	36	36	36	36	
31.0	38	38	38	38	37	37	37	37	37	36	
31.5	39	39	39	38	38	38	38	37	37	37	
32.0	40	39	39	39	39	38	38	38	38	38	
32.5	40	40	40	40	39	39	39	39	38	38	
33.0	41	41	40	40	40	40	39	39	39	39	
33.5	42	41	41	41	41	40	40	40	40	39	
34.0	42	42	42	41	41	41	41	40	40	40	

*Circumference value = abdomen circumference - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR MEN

Circumference Value*	Height (inches)										
	70.0	70.5	71.0	71.5	72.0	72.5	73.0	73.5	74.0	74.5	
14.0	7	6	6	6	6	6	5	5	5	5	
14.5	8	8	7	7	7	7	7	6	6	6	
15.0	9	9	9	8	8	8	8	8	7	7	
15.5	10	10	10	9	9	9	9	9	9	8	
16.0	11	11	11	11	10	10	10	10	10	9	
16.5	12	12	12	12	12	11	11	11	11	11	
17.0	13	13	13	13	13	12	12	12	12	12	
17.5	14	14	14	14	14	13	13	13	13	13	
18.0	15	15	15	15	15	14	14	14	14	14	
18.5	16	16	16	16	16	15	15	15	15	15	
19.0	17	17	17	17	17	16	16	16	16	16	
19.5	18	18	18	18	18	17	17	17	17	17	
20.0	19	19	19	19	18	18	18	18	18	17	
20.5	20	20	20	20	19	19	19	19	19	18	
21.0	21	21	21	20	20	20	20	20	19	19	
21.5	22	22	22	21	21	21	21	21	20	20	
22.0	23	23	22	22	22	22	22	21	21	21	
22.5	24	23	23	23	23	23	22	22	22	22	
23.0	25	24	24	24	24	23	23	23	23	23	
23.5	25	25	25	25	24	24	24	24	24	23	
24.0	26	26	26	25	25	25	25	25	24	24	
24.5	27	27	26	26	26	26	26	25	25	25	
25.0	28	27	27	27	27	27	26	26	26	26	
25.5	28	28	28	28	28	27	27	27	27	27	
26.0	29	29	29	29	28	28	28	28	27	27	
26.5	30	30	29	29	29	29	29	28	28	28	
27.0	31	30	30	30	30	30	29	29	29	29	
27.5	31	31	31	31	30	30	30	30	30	29	
28.0	32	32	32	31	31	31	31	31	30	30	
28.5	33	33	32	32	32	32	31	31	31	31	
29.0	33	33	33	33	33	32	32	32	32	31	
29.5	34	34	34	33	33	33	33	33	32	32	
30.0	35	35	34	34	34	34	33	33	33	33	
30.5	35	35	35	35	35	34	34	34	34	33	
31.0	36	36	36	35	35	35	35	34	34	34	
31.5	37	36	36	36	36	36	35	35	35	35	
32.0	37	37	37	37	36	36	36	36	36	35	
32.5	38	38	37	37	37	37	37	36	36	36	
33.0	39	38	38	38	38	37	37	37	37	37	
33.5	39	39	39	38	38	38	38	38	37	37	
34.0	40	39	39	39	39	39	38	38	38	38	
34.5	40	40	40	40	39	39	39	39	39	38	
35.0	41	41	40	40	40	40	40	39	39	39	

*Circumference value = abdomen circumference - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR MEN

Circumference Value*	HEIGHT (inches)									
	75.0	75.5	76.0	76.5	77.0	77.5	78.0	78.5	79.0	79.5
15.0	7	7	7	6	6	6	6	6	6	5
15.5	8	8	8	8	7	7	7	7	7	6
16.0	9	9	9	9	9	8	8	8	8	8
16.5	10	10	10	10	10	9	9	9	9	9
17.0	11	11	11	11	11	10	10	10	10	10
17.5	12	12	12	12	12	11	11	11	11	11
18.0	13	13	13	13	13	12	12	12	12	12
18.5	14	14	14	14	14	13	13	13	13	13
19.0	15	15	15	15	15	14	14	14	14	14
19.5	16	16	16	16	16	15	15	15	15	15
20.0	17	17	17	17	16	16	16	16	16	16
20.5	18	18	18	18	17	17	17	17	17	16
21.0	19	19	19	18	18	18	18	18	18	17
21.5	20	20	20	19	19	19	19	19	18	18
22.0	21	21	20	20	20	20	20	19	19	19
22.5	22	21	21	21	21	20	20	20	20	20
23.0	22	22	22	22	22	21	21	21	21	21
23.5	23	23	23	23	22	22	22	22	22	21
24.0	24	24	24	23	23	23	23	23	22	22
24.5	25	25	24	24	24	24	24	23	23	23
25.0	26	25	25	25	25	25	24	24	24	24
25.5	26	26	26	26	26	25	25	25	25	25
26.0	27	27	27	26	26	26	26	26	25	25
26.5	28	28	27	27	27	27	27	26	26	26
27.0	28	28	28	28	28	27	27	27	27	27
27.5	29	29	29	29	28	28	28	28	28	27
28.0	30	30	29	29	29	29	29	28	28	28
28.5	31	30	30	30	30	30	29	29	29	29
29.0	31	31	31	31	30	30	30	30	30	29
29.5	32	32	31	31	31	31	31	30	30	30
30.0	33	32	32	32	32	32	31	31	31	31
30.5	33	33	33	33	32	32	32	32	32	31
31.0	34	34	33	33	33	33	33	32	32	32
31.5	34	34	34	34	34	33	33	33	33	33
32.0	35	35	35	34	34	34	34	34	33	33
32.5	36	35	35	35	35	35	34	34	34	34
33.0	36	36	36	35	35	35	35	35	35	34
33.5	37	37	36	36	36	36	36	35	35	35
34.0	37	37	37	37	37	36	36	36	36	36
34.5	38	38	38	37	37	37	37	37	36	36
35.0	39	38	38	38	38	38	37	37	37	37
35.5	39	39	39	39	38	38	38	38	38	37
36.0	40	40	39	39	39	39	39	38	38	38
36.5	40	40	40	40	39	39	39	39	39	38
37.0	41	41	40	40	40	40	40	39	39	39
37.5	41	41	41	41	41	40	40	40	40	40

*Circumference value = abdomen circumference - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	HEIGHT (Inches)									
	58.0	58.5	59.0	59.5	60.0	60.5	61.0	61.5	62.0	62.5
35.5	4	4	3	3	3	2	2	2	1	1
36.0	5	4	4	4	3	3	3	2	2	2
36.5	6	5	5	5	4	4	4	3	3	3
37.0	7	6	6	5	5	5	4	4	4	4
37.5	7	7	7	6	6	6	5	5	5	4
38.0	8	8	8	7	7	7	6	6	6	5
38.5	9	9	8	8	8	7	7	7	6	6
39.0	10	10	9	9	9	8	8	8	7	7
39.5	11	10	10	10	9	9	9	8	8	8
40.0	12	11	11	10	10	10	9	9	9	8
40.5	12	12	12	11	11	11	10	10	10	9
41.0	13	13	12	12	12	11	11	11	10	10
41.5	14	14	13	13	13	12	12	12	11	11
42.0	15	14	14	14	13	13	13	12	12	12
42.5	16	15	15	14	14	14	13	13	13	12
43.0	16	16	16	15	15	15	14	14	14	13
43.5	17	17	16	16	16	15	15	15	14	14
44.0	18	18	17	17	16	16	16	15	15	15
44.5	19	18	18	18	17	17	16	16	16	15
45.0	19	19	19	18	18	18	17	17	17	16
45.5	20	20	19	19	19	18	18	18	17	17
46.0	21	21	20	20	19	19	19	18	18	18
46.5	22	21	21	21	20	20	19	19	19	18
47.0	22	22	22	21	21	21	20	20	19	19
47.5	23	23	22	22	22	21	21	21	20	20
48.0	24	23	23	23	22	22	22	21	21	21
48.5	25	24	24	23	23	23	22	22	22	21
49.0	25	25	24	24	24	23	23	23	22	22
49.5	26	26	25	25	24	24	24	23	23	23
50.0	27	26	26	25	25	25	24	24	24	23
50.5	27	27	27	26	26	25	25	25	24	24
51.0	28	28	27	27	27	26	26	25	25	25
51.5	29	28	28	28	27	27	26	26	26	25
52.0	29	29	29	28	28	28	27	27	26	26
52.5	30	30	29	29	29	28	28	27	27	27
53.0	31	30	30	30	29	29	28	28	28	27
53.5	31	31	31	30	30	30	29	29	28	28
54.0	32	32	31	31	31	30	30	29	29	29
54.5	33	32	32	32	31	31	30	30	30	29
55.0	33	33	33	32	32	31	31	31	30	30
55.5	34	34	33	33	32	32	32	31	31	31
56.0	35	34	34	34	33	33	32	32	32	31
56.5	35	35	35	34	34	33	33	33	32	32
57.0	36	36	35	35	34	34	34	33	33	33
57.5	37	36	36	35	35	35	34	34	34	33
58.0	37	37	36	36	36	35	35	35	34	34
58.5	38	37	37	37	36	36	36	35	35	34

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (Inches)									
	58.0	58.5	59.0	59.5	60.0	60.5	61.0	61.5	62.0	62.5
59.0	38	38	38	37	37	37	36	36	35	35
59.5	39	39	38	38	38	37	37	36	36	36
60.0	40	39	39	39	38	38	37	37	37	36
60.5	40	40	40	39	39	38	38	38	37	37
61.0	41	41	40	40	39	39	39	38	38	37
61.5	42	41	41	40	40	40	39	39	38	38
62.0	42	42	41	41	41	40	40	39	39	39
62.5	43	42	42	42	41	41	40	40	40	39
63.0	43	43	43	42	42	41	41	41	40	40
63.5	44	43	43	43	42	42	42	41	41	40
64.0	44	44	44	43	43	42	42	42	41	41
64.5	45	45	44	44	43	43	43	42	42	42
65.0	46	45	45	44	44	44	43	43	42	42
65.5	46	46	45	45	45	44	44	43	43	43
66.0	47	46	46	46	45	45	44	44	44	43
66.5	47	47	47	46	46	45	45	45	44	44
67.0	48	48	47	47	46	46	46	45	45	44
67.5	49	48	48	47	47	46	46	46	45	45
68.0	49	49	48	48	47	47	47	46	46	46

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)									
	63.0	63.5	64.0	64.5	65.0	65.5	66.0	66.5	67.0	67.5
36.0	1	1	1	1	-	-	-	-	-	-
36.5	2	2	2	1	1	1	-	-	-	-
37.0	3	3	3	2	2	2	1	1	1	-
37.5	4	4	3	3	3	2	2	2	2	1
38.0	5	5	4	4	4	3	3	3	2	2
38.5	6	5	5	5	4	4	4	4	3	3
39.0	7	6	6	6	5	5	5	4	4	4
39.5	7	7	7	6	6	6	5	5	5	5
40.0	8	8	8	7	7	7	6	6	6	5
40.5	9	9	8	8	8	7	7	7	6	6
41.0	10	9	9	9	8	8	8	8	7	7
41.5	11	10	10	10	9	9	9	8	8	8
42.0	11	11	11	10	10	10	9	9	9	8
42.5	12	12	11	11	11	10	10	10	10	9
43.0	13	13	12	12	12	11	11	11	10	10
43.5	14	13	13	13	12	12	12	11	11	11
44.0	14	14	14	13	13	13	12	12	12	12
44.5	15	15	14	14	14	14	13	13	13	12
45.0	16	16	15	15	15	14	14	14	13	13
45.5	17	16	16	16	15	15	15	14	14	14
46.0	17	17	17	16	16	16	15	15	15	14
46.5	18	18	17	17	17	16	16	16	15	15
47.0	19	18	18	18	17	17	17	16	16	16
47.5	20	19	19	19	18	18	18	17	17	17
48.0	20	20	20	19	19	19	18	18	18	17
48.5	21	21	20	20	20	19	19	19	18	18
49.0	22	21	21	21	20	20	20	19	19	19
49.5	22	22	22	21	21	21	20	20	20	19
50.0	23	23	22	22	22	21	21	21	20	20
50.5	24	23	23	23	22	22	22	21	21	21
51.0	24	24	24	23	23	23	22	22	22	21
51.5	25	25	24	24	24	23	23	23	22	22
52.0	26	25	25	25	24	24	24	23	23	23
52.5	26	26	26	25	25	25	24	24	24	23
53.0	27	27	26	26	26	25	25	25	24	24
53.5	28	27	27	27	26	26	26	25	25	25
54.0	28	28	28	27	27	27	26	26	26	25
54.5	29	29	28	28	28	27	27	27	26	26
55.0	30	29	29	29	28	28	28	27	27	27
55.5	30	30	30	29	29	29	28	28	28	27

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)									
	63.0	63.5	64.0	64.5	65.0	65.5	66.0	66.5	67.0	67.5
56.0	31	31	30	30	30	29	29	29	28	28
56.5	32	31	31	31	30	30	29	29	29	28
57.0	32	32	31	31	31	30	30	30	29	29
57.5	33	32	32	32	31	31	31	30	30	30
58.0	33	33	33	32	32	32	31	31	31	30
58.5	34	34	33	33	33	32	32	32	31	31
59.0	35	34	34	34	33	33	33	32	32	32
59.5	35	35	35	34	34	33	33	33	32	32
60.0	36	36	35	35	34	34	34	33	33	33
60.5	36	36	36	35	35	35	34	34	34	33
61.0	37	37	36	36	36	35	35	35	34	34
61.5	38	37	37	37	36	36	36	35	35	35
62.0	38	38	38	37	37	36	36	36	35	35
62.5	39	38	38	38	37	37	37	36	36	36
63.0	39	39	39	38	38	38	37	37	37	36
63.5	40	40	39	39	39	38	38	38	37	37
64.0	41	40	40	40	39	39	38	38	38	37
64.5	41	41	40	40	40	39	39	39	38	38
65.0	42	41	41	41	40	40	40	39	39	39
65.5	42	42	42	41	41	40	40	40	39	39
66.0	43	43	42	42	41	41	41	40	40	40
66.5	43	43	43	42	42	42	41	41	41	40
67.0	44	44	43	43	43	42	42	41	41	41
67.5	45	44	44	43	43	43	42	42	42	41
68.0	45	45	44	44	44	43	43	43	42	42
68.5	46	45	45	45	44	44	43	43	43	42
69.0	46	46	45	45	45	44	44	44	43	43
69.5	47	46	46	46	45	45	45	44	44	43
70.0	47	47	47	46	46	45	45	45	44	44
70.5	48	47	47	47	46	46	46	45	45	45
71.0	48	48	48	47	47	47	46	46	45	45

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)									
	68.0	68.5	69.0	69.5	70.0	70.5	71.0	71.5	72.0	72.5
38.0	2	2	1	1	1	-	-	-	-	-
38.5	3	2	2	2	2	1	1	1	-	-
39.0	3	3	3	3	2	2	2	1	1	1
39.5	4	4	4	3	3	3	3	2	2	2
40.0	5	5	4	4	4	4	3	3	3	3
40.5	6	6	5	5	5	4	4	4	4	3
41.0	7	6	6	6	5	5	5	5	4	4
41.5	7	7	7	7	6	6	6	5	5	5
42.0	8	8	8	7	7	7	6	6	6	6
42.5	9	9	8	8	8	7	7	7	7	6
43.0	10	9	9	9	9	8	8	8	7	7
43.5	10	10	10	10	9	9	9	8	8	8
44.0	11	11	11	10	10	10	9	9	9	9
44.5	12	12	11	11	11	10	10	10	10	9
45.0	13	12	12	12	11	11	11	11	10	10
45.5	13	13	13	13	12	12	12	11	11	11
46.0	14	14	14	13	13	13	12	12	12	11
46.5	15	15	14	14	14	13	13	13	12	12
47.0	16	15	15	15	14	14	14	13	13	13
47.5	16	16	16	15	15	15	14	14	14	14
48.0	17	17	16	16	16	15	15	15	15	14
48.5	18	17	17	17	16	16	16	16	15	15
49.0	18	18	18	17	17	17	17	16	16	16
49.5	19	19	18	18	18	18	17	17	17	16
50.0	20	19	19	19	18	18	18	18	17	17
50.5	20	20	20	19	19	19	19	18	18	18
51.0	21	21	20	20	20	20	19	19	19	18
51.5	22	21	21	21	20	20	20	20	19	19
52.0	22	22	22	21	21	21	21	20	20	20
52.5	23	23	22	22	22	21	21	21	21	20
53.0	24	23	23	23	22	22	22	22	21	21
53.5	24	24	24	23	23	23	22	22	22	22
54.0	25	25	24	24	24	23	23	23	23	22
54.5	26	25	25	25	24	24	24	23	23	23
55.0	26	26	26	25	25	25	24	24	24	23
55.5	27	27	26	26	26	25	25	25	24	24
56.0	28	27	27	27	26	26	26	25	25	25

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)										
	68.0	68.5	69.0	69.5	70.0	70.5	71.0	71.5	72.0	72.5	
56.5	28	28	28	27	27	27	26	26	26	25	
57.0	29	28	28	28	27	27	27	27	26	26	
57.5	29	29	29	28	28	28	27	27	27	27	
58.0	30	30	29	29	29	28	28	28	27	27	
58.5	31	30	30	30	29	29	29	28	28	28	
59.0	31	31	31	30	30	30	29	29	29	28	
59.5	32	31	31	31	31	30	30	30	29	29	
60.0	32	32	32	31	31	31	30	30	30	30	
60.5	33	33	32	32	32	31	31	31	30	30	
61.0	34	33	33	33	32	32	32	31	31	31	
61.5	34	34	34	33	33	33	32	32	32	31	
62.0	35	34	34	34	33	33	33	32	32	32	
62.5	35	35	35	34	34	34	33	33	33	32	
63.0	36	36	35	35	35	34	34	34	33	33	
63.5	36	36	36	35	35	35	35	34	34	34	
64.0	37	37	36	36	36	35	35	35	34	34	
64.5	38	37	37	37	36	36	36	35	35	35	
65.0	38	38	38	37	37	37	36	36	36	35	
65.5	39	38	38	38	37	37	37	36	36	36	
66.0	39	39	39	38	38	38	37	37	37	36	
66.5	40	40	39	39	39	38	38	38	37	37	
67.0	40	40	40	39	39	39	38	38	38	37	
67.5	41	41	40	40	40	39	39	38	38	38	
68.0	42	41	41	40	40	40	40	39	39	39	
68.5	42	42	41	41	41	40	40	40	39	39	
69.0	43	42	42	42	41	41	41	40	40	40	
69.5	43	43	42	42	42	41	41	41	40	40	
70.0	44	43	43	43	42	42	42	41	41	41	
70.5	44	44	44	43	43	43	42	42	42	41	
71.0	45	44	44	44	43	43	43	42	42	42	
71.5	45	45	45	44	44	44	43	43	43	42	
72.0	46	45	45	45	44	44	44	43	43	43	
72.5	46	46	46	45	45	45	44	44	44	43	
73.0	47	46	46	46	45	45	45	44	44	44	
73.5	47	47	47	46	46	46	45	45	45	44	
74.0	48	48	47	47	46	46	46	45	45	45	

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)										
	73.0	73.5	74.0	74.5	75.0	75.5	76.0	76.5	77.0	77.5	
39.5	1	1	1	1	-	-	-	-	-	-	
40.0	2	2	2	1	1	1	1	-	-	-	
40.5	3	3	2	2	2	2	1	1	1	1	
41.0	4	4	3	3	3	2	2	2	2	1	
41.5	5	4	4	4	3	3	3	3	2	2	
42.0	5	5	5	5	4	4	4	3	3	3	
42.5	6	6	6	5	5	5	4	4	4	4	
43.0	7	7	6	6	6	5	5	5	5	4	
43.5	8	7	7	7	6	6	6	6	5	5	
44.0	8	8	8	7	7	7	7	6	6	6	
44.5	9	9	8	8	8	8	7	7	7	7	
45.0	10	9	9	9	9	8	8	8	8	7	
45.5	10	10	10	10	9	9	9	9	8	8	
46.0	11	11	11	10	10	10	10	9	9	9	
46.5	12	12	11	11	11	11	10	10	10	9	
47.0	13	12	12	12	11	11	11	11	10	10	
47.5	13	13	13	12	12	12	12	11	11	11	
48.0	14	14	13	13	13	13	12	12	12	12	
48.5	15	14	14	14	14	13	13	13	12	12	
49.0	15	15	15	15	14	14	14	13	13	13	
49.5	16	16	15	15	15	15	14	14	14	14	
50.0	17	16	16	16	16	15	15	15	14	14	
50.5	17	17	17	17	16	16	16	15	15	15	
51.0	18	18	17	17	17	17	16	16	16	16	
51.5	19	18	18	18	18	17	17	17	16	16	
52.0	19	19	19	18	18	18	18	17	17	17	
52.5	20	20	19	19	19	19	18	18	18	17	
53.0	21	20	20	20	19	19	19	19	18	18	
53.5	21	21	21	20	20	20	20	19	19	19	
54.0	22	22	21	21	21	20	20	20	20	19	
54.5	23	22	22	22	21	21	21	21	20	20	
55.0	23	23	23	22	22	22	21	21	21	21	
55.5	24	23	23	23	23	22	22	22	21	21	
56.0	24	24	24	24	23	23	23	22	22	22	
56.5	25	25	24	24	24	24	23	23	23	22	
57.0	26	25	25	25	24	24	24	24	23	23	

* Circumference value = natural waist + hip - neck circumference (in inches)

PERCENT FAT ESTIMATION FOR WOMEN

Circumference Value*	Height (inches)										
	73.0	73.5	74.0	74.5	75.0	75.5	76.0	76.5	77.0	77.5	
57.5	26	26	26	25	25	25	24	24	24	24	
58.0	27	27	26	26	26	25	25	25	25	24	
58.5	27	27	27	27	26	26	26	25	25	25	
59.0	28	28	27	27	27	27	26	26	26	25	
59.5	29	28	28	28	27	27	27	27	26	26	
60.0	29	29	29	28	28	28	27	27	27	27	
60.5	30	30	29	29	29	28	28	28	27	27	
61.0	30	30	30	29	29	29	29	28	28	28	
61.5	31	31	30	30	30	29	29	29	29	28	
62.0	32	31	31	31	30	30	30	29	29	29	
62.5	32	32	32	31	31	31	30	30	30	29	
63.0	33	32	32	32	31	31	31	31	30	30	
63.5	33	33	33	32	32	32	31	31	31	31	
64.0	34	34	33	33	33	32	32	32	31	31	
64.5	34	34	34	33	33	33	33	32	32	32	
65.0	35	35	34	34	34	33	33	33	33	32	
65.5	35	35	35	35	34	34	34	33	33	33	
66.0	36	36	35	35	35	35	34	34	34	33	
66.5	37	36	36	36	35	35	35	34	34	34	
67.0	37	37	37	36	36	36	35	35	35	34	
67.5	38	37	37	37	36	36	36	36	35	35	
68.0	38	38	38	37	37	37	36	36	36	35	
68.5	39	38	38	38	38	37	37	37	36	36	
69.0	39	39	39	38	38	38	37	37	37	37	
69.5	40	40	39	39	39	38	38	38	37	37	
70.0	40	40	40	39	39	39	38	38	38	38	
70.5	41	41	40	40	40	39	39	39	38	38	
71.0	41	41	41	40	40	40	40	39	39	39	
71.5	42	42	41	41	41	40	40	40	39	39	
72.0	42	42	42	41	41	41	41	40	40	40	
72.5	43	43	42	42	42	41	41	41	40	40	
73.0	43	43	43	43	42	42	42	41	41	41	
73.5	44	44	43	43	43	42	42	42	41	41	
74.0	44	44	44	44	43	43	43	42	42	42	

* Circumference value = natural waist + hip - neck circumference (in inches)